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Introduction

- During the summer of 2003, 8 outstanding undergraduate students from 7 universities were awarded fellowships for training in breast cancer research. Depending on the date the various universities completed their academic year, the trainees began their research experience in late May or early June of 2003 and completed 10 weeks of training in August.
- The 8 fellows were mentored by 8 individual faculty members during their training and conducted investigations in a variety of different topics concerned with breast cancer.
- Studies were carried out in cell signaling, immunotherapy, tumor progression, regulation of DNA repair, examination of estrogen receptor domains, examination of metalloproteinases in metastasis, and the effect of isoflavones on breast cancer cell lines
- During their training, fellows interacted not only with their mentor but had the opportunity to work with predoctoral students and postdoctoral fellows in their laboratory. Furthermore, the group of undergraduate fellows had the opportunity to discuss their research project with each other and attend institutional seminars and grand rounds, giving the trainees some feeling of the broad areas which cancer research encompasses.
- At the end of the training period, the fellows gave a poster presentation of their individual projects to the Karmanos Cancer Institute/Wayne State University faculty and students.

Body of Report

1. Recruiting

- a. The color brochure describing the Undergraduate Summer Fellowships in Breast Cancer Research (see Appendix of progress report of March 31, 2003) was sent (October, 2003; 2nd mailing) to science departments of 75 colleges and universities in Michigan, Ohio, Indiana and Illinois. In addition, fellows from the summer of 2002 aided our recruiting efforts at their institutions. As a result, the program had 10 applications for the 8 positions in the summer of 2003. These efforts have been more effective for the coming summer of 2004. Presently there have been 25 applications for this year's program. These applicants are enrolled in 20 separate colleges and universities. Applications are now coming from colleges and universities outside the Midwest (e.g. Maryland, Georgia, New Jersey).

2. Initiation of Program

Last year (Summer 2003), we received 10 applications for the summer undergraduate fellowships. These applicants learned of the program by "word of mouth" and via our brochure which was distributed to 75 colleges and universities. Applicants sent letters indicating their interest in breast cancer research, their curriculum vitae and a description of their research accomplishments. Applications were screened by a 3-member recruiting committee and the materials for 8 top rated applicants were distributed to the 11 faculty of the training staff for consideration. At a subsequent meeting of the faculty, the 8 fellows were matched with faculty having similar research interests.

The successful applicants were notified in April and fellowships starting dates arranged.

3. Training Program

The Fellows were assembled for an orientation on May 8, 2003 in which an overview of the program was presented and they were familiarized with laboratory and personnel procedures. At this time, most of the fellows met with their mentors. In spite of the variation in the academic year of the undergraduate universities of each fellow, start dates for the fellowships were kept to a narrow window. All trainees began their fellowship between May 25 and June 9.

The fellows selected for the program are listed in Table 1 along with their undergraduate universities, mentors and title of their research project (poster).

During the summer program, the progress of each student was monitored by the Director of the program. As each fellow reached the end of his/her 10-week training, instructions were given on preparation of posters with which to present their accomplishments. A "Poster Day" was held on August 6, 2003, during which the fellows presented their research to the body of fellows, the training faculty and the staff of the Karmanos Cancer Institute. Each fellow was presented with a certificate denoting their successful participation in the program.

4. Evaluation of the Program and Modifications

We have found that by paying close attention to the progress of each fellow the training faculty can access the quality of the program. Students were routinely queried regarding what they expected from the experience and how this related to the training they were receiving. It appears that each found the fellowship beyond their expectations. This feeling persisted through the poster presentations.

In addition, faculty evaluation has been carried out after the training had been finished. Overall the mentors were excited about the students and their performance. It was felt that having the fellows begin their training within a narrow period of time benefited the Program. For example, the posters were of similar quality in demonstrating the student's accomplishment and understanding since all students had completed their projects by Poster Day. Last year posters were presented before some fellows had completed their projects. In addition, it was felt that weekly meetings of the 8 fellows in which they would alternate in the presentation of their research progress to each other and members of the faculty was beneficial.

Follow-up questionnaires (see appendix) were sent to the fellows of the initial year (summer 2002) in April 2003. These questionnaires were sent again to the trainees of the summer of 2003 in January 2004. The fellows' responses enabled the training faculty to evaluate the fellowship after the students were able to reflect on their experience. To date, we have received responses from 13 of the 16 undergraduates who have completed the Program. We are pleased to learn that overall the fellows had a positive experience. All are impressed by their research experience and would recommend our program to other students.

While the responses to the remaining questions in the questionnaire were generally positive (i.e. 10 out of 13), a few fellows made specific comments which will aid in improving our program.

- Several students felt that they did not contribute significantly to their poster (“project did not succeed” or “he(she) required too much help”, or “mentor was condescending”).
- Although a number of students were nervous at the poster presentation, they appreciated that it was not competitive in nature.
- One biomedical engineering student found immunology to be beyond his knowledge.

The faculty felt that these shortcomings can be corrected by doing a better job of matching the students background skills with the mentor’s project, thereby assuring greater accomplishments during the 10 week training period. This will be accomplished with interviews during orientation.

Ten out of 13 fellows responded that their experience solidified their desire to have a career in research, some with a Ph.D., most with an M.D. Those who responded that the experience would not change their career plans and had previously decided to direct their careers toward research. One student (E. Masko) applied to our Graduate Program in Cancer Biology. She hopes to enter the Program with the class beginning September 2004 and continue her breast cancer research.

Table I**Undergraduate Summer Fellows in Breast Cancer Research (2003)**

Fellows	Undergraduate Institution	Mentor	Poster Title
1. Ifrah Ali	Wayne State University	F. Sarkar, Ph.D.	Effects of Genistein and B1-193 on BT474 Breast Cancer Cell Line
2. Stephanie Busch	Kalamazoo College	K. Reddy, Ph.D.	The Role of PI3K/AKT2 Pathway in Estrogen-mediated breast cancer resistance
3. Andi Cani	Wayne State University	W-Z Wei, Ph.D.	Human ErbB2 Transgenic Mouse line
4. Kristina Harrell	Clafin University	F. Miller, Ph.D.	Analysis of Progression in Mouse Mammary Tumors
5. Sarah Jenkins	St. U. of West Georgia	M. Shekhar, Ph.D.	Characterization of the 5' Upstream Regulatory Region of the Rad6B Gene
6. Chiriyere Knight	Howard University	D. Skafar, Ph.D.	The Response of the Mutated hER α at L536K/S554stop and L536N/S554stop to Estradiol
7. Elizabeth Masko	N. Central Univ. Illinois	R. Friedman, Ph.D.	The Activation of Catalyzation of MT1-MMP Soluble Species
8. Prakash Vempati	John Hopkins	J-K Mitchell Ph.D.	MG50 Expression in Breast and Prostate Cancers

APPENDIX

1. Questionnaire – “Evaluation Questionnaire: Undergraduate Summer Fellowships in Breast Cancer Research”

2003 Evaluation Questionnaire
Undergraduate Summer Fellowships in Breast Cancer Research

1. Please identify your mentor and give the title of your research poster presented at the end of your fellowship in the Summer of 2002.

2. Do you feel that you contributed significantly to the research documented in your poster?

3. Do you feel that you presented the findings and conclusions of your research in a confident manner?

4. Did you have the feeling that you would have liked to continue working your project although your fellowship had terminated and it was necessary that you return to your college/university?

5. Would you advise other students to apply to our program?

6. Did you learn a lot? As much as you hoped you would during your Summer of 2002? Please explain.

7. Were you impressed by the research experience? Has the experience affected your academic or career plans in anyway? Please explain.